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# Educating architects in environmental design: pedagogical strategies to enable the ‘grasping of the unfamiliar.’

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**ABSTRACT** Contemporary architects increasingly work more frequently in a larger variety of environments and circumstances than their bygone counterparts, and now require an improved set of skills to navigate this unfamiliar territory. This paper uses a case study approach of the pedagogical devices employed on the module “Environmental Design of Buildings” taught in Welsh School of Architecture which aims to teach contemporary architects such skills - how to work in climatically changing, unexperienced and unfamiliar contexts and within culturally diverse design teams. Devices used include the self-brief, distance learning and a fellow student acting as site ‘buddy’ and interview to verify findings, and detail an approach to environmental and sustainable design at a postgraduate level. Discussion is aided by the findings of a student questionnaire which asked students to evaluate the devices used.

**KEYWORDS** environmental design education, communities of practice, architectural pedagogical devices, sustainable design, distance learning

Contemporary architects work increasingly in a larger variety of contexts, environments and circumstances than their historic counterparts. The modern world is a global one, where the information age, technology and educational and professional mobility enable the barrier of physical distance to be removed and opens up foreign markets to both architecture students and professionals alike. The globalisation of

the professional means architects - and those currently in architectural education - simultaneously require transnational identities yet need to recognise that ‘place’ and identity of place still remain important.<sup>1</sup>

It may be argued that the trajectory of this development may be somewhat associated with the early 20<sup>th</sup> century and the birth of the International Style, characterised by an

architectural aesthetic that was largely bereft of a regional or local expression.

James Faulconbridge argues that the global architecture style does not necessarily equate to “cultural homogenisation”<sup>2</sup> but nonetheless concedes that designing buildings from a distance in unfamiliar contexts may result in an architecture with little contextual connection to place; and that in fact further study is required to evaluate building *performance* in these instances<sup>3</sup> as a distinct study. This latter point corresponds with the approach taken by the case study module that is the subject of this paper. The case study module addresses this aspect in that whilst the architectural aesthetic of a global architectural style may be deliberated, it requires that the building *must* respond specifically to the cultural context and microclimate it is situated in. In this module, microclimate analysis goes beyond environmental factors and requires students to undertake an immersion in, and evaluation of the social and cultural context of the site. Whilst global architecture firms may sidestep such requirements as they have the means to locate local offices in the contexts in which they work so the work can be informed by “‘local,’ ‘contextual’ knowledge relating to consumer norms and expectations as well as local regulatory standards”<sup>4</sup> not all architects have this amenity, and it is a facility most definitely out of reach to architectural students.

Furthermore, many architectural students choose to study internationally. What is more generally the norm is that architects study and work in unfamiliar contexts and climates to those of their birth or residence - oftentimes without physically visiting such places, and without the benefit of ‘ears on the ground.’

Whereas historically architects and architectural students could draw on their local community of practice or their intrinsic understanding and experience in terms of understanding indigenous custom, social norms and microclimate; designing from afar in unfamiliar contexts means “architects designing a building may have little experience of the cultural, economic, political and social context of the place.”<sup>5</sup> Therefore contemporary architects and architecture students must use an adaptive set of skills to navigate this unfamiliar territory. These factors converge to disenfranchise architects and architectural

students from finding a ‘way-in’ to an unknown context. In order to address this problem, this paper offers pedagogical devices to architectural educators to enable students overcome these challenges and learn an adapted environmental design process for unfamiliar contexts. The approach of this paper is therefore to offer a reflection on contemporary teaching and learning within this context through a case study approach of the Environmental Design Practice (EDP) module, an integral project which is part of the Environmental Design of Buildings (EDB) MSc taught in the Welsh School of Architecture at Cardiff University. The general issues outlined above on the globalisation of architecture and architectural education are apparent in this particular course.

The aim of this paper is, therefore, to ask what pedagogical solutions could be offered to tackle these issues and the case study discussed is used as an exemplar to both provide description and generate further discussion and theory in this area. It should be noted that in the context of this case study module and this paper the ‘unfamiliar’ is defined as countries climates and cultures students have not experienced or lived in (as climate needs to be experienced for at least a full season to be fully familiar).

## Methodology

As is typical in case studies,<sup>6</sup> data collection methods are combined and both observation (qualitative) and questionnaires (quantitative) are used in this research. Observations and reflections are made on the authors eight years of teaching practice of this module which enable “subjective meanings [to] provide acceptable knowledge.”<sup>7</sup> This paper also draws on questionnaire responses which were distributed digitally to a random selection of 40 alumni of varied past cohorts of the EDB course, with a 23% response rate. The author acknowledges limitations in terms of the relatively small sample size of questionnaire responses and the potential subjectivity of the observations made. As such this research does not seek to reveal indisputable fact but rather reveal aspects of real world teaching practice which can inform and improve current architectural pedagogy. This research is seen as part of a “systematic production of exemplars.”<sup>8</sup>

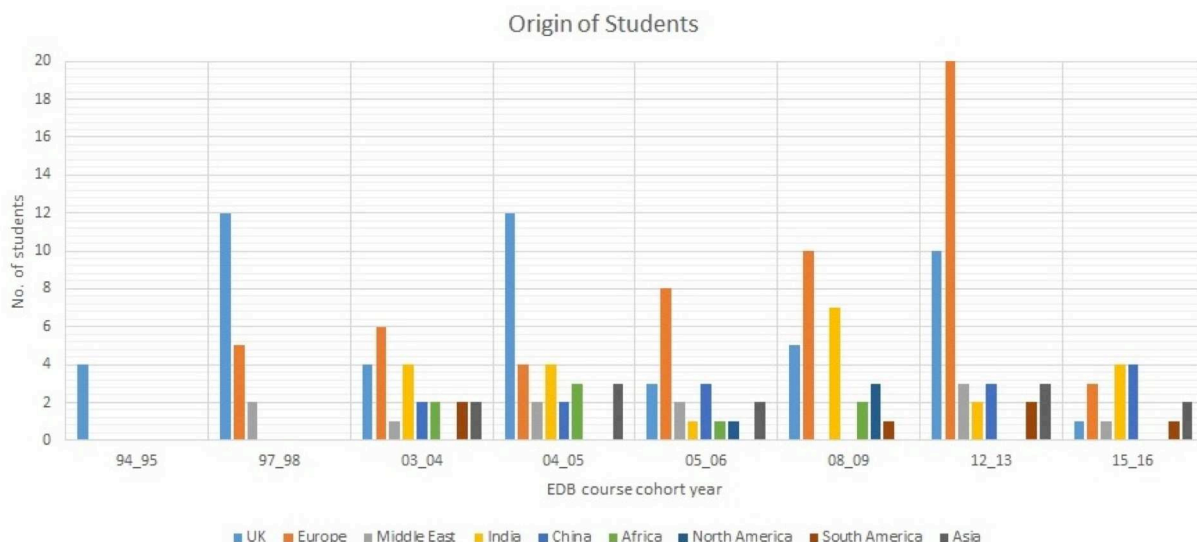


Figure 1: Diversity of student body (Author)

### Case study module

The EDB MSc course began in 1993, with a distance learning version of the course commencing in 2002. Students have the flexibility to complete the course locally in Cardiff in one year full time or two years part time, or by one, two or three year modes through distance learning. The course - in line with general trends in UK education<sup>9</sup> - has an increasingly and consistently diverse student body (Figure 1).

This diversity - coupled with the fact that local and distance students collaborate throughout the course - enhances the international dimension of the course. This effect is purposely utilised and channelled as a pedagogical tool throughout the course but in the EDP project module in particular. This module draws on the diversity of the student body and uses this as a learning tool to address geographical, economic and social differences between known and unknown contexts. It uses several pedagogical devices in order to teach contemporary architects how to work in such, unfamiliar contexts and within culturally diverse design teams. In this paper we will call this learned attribute in students “grasping the unfamiliar.” The pedagogical devices employed in this module to channel this ability are explored in detail below and draw on observation of teaching experience, student work examples and a student questionnaire.

### Pedagogical Devices Utilised

The structures and devices used include:

- the ‘self-brief;’
- site ‘buddy’ and interview;
- distance learning;
- use of both qualitative and quantitative information to round out an argument;
- comparing known actualities to unknown.

Each strategy will be summarised and evaluated in terms of its promotion of grasping the unfamiliar, with reference to literature, student work, observations and student questionnaire responses.

It should be noted that the strategies outlined have been developed from a recognition of the need to enable students to work within diversity. These pedagogical structures use the

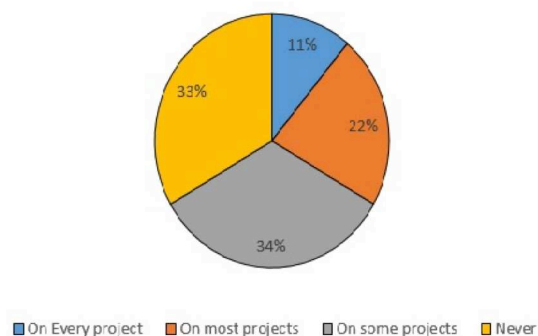


Figure 2: Frequency working in unfamiliar contexts (Author)

learning outcome requirements at postgraduate



# Micro climate

## Shadow analysis

乡间度假屋  
陽朔 | 中國

RURAL RETREAT  
yangshuo | CHINA

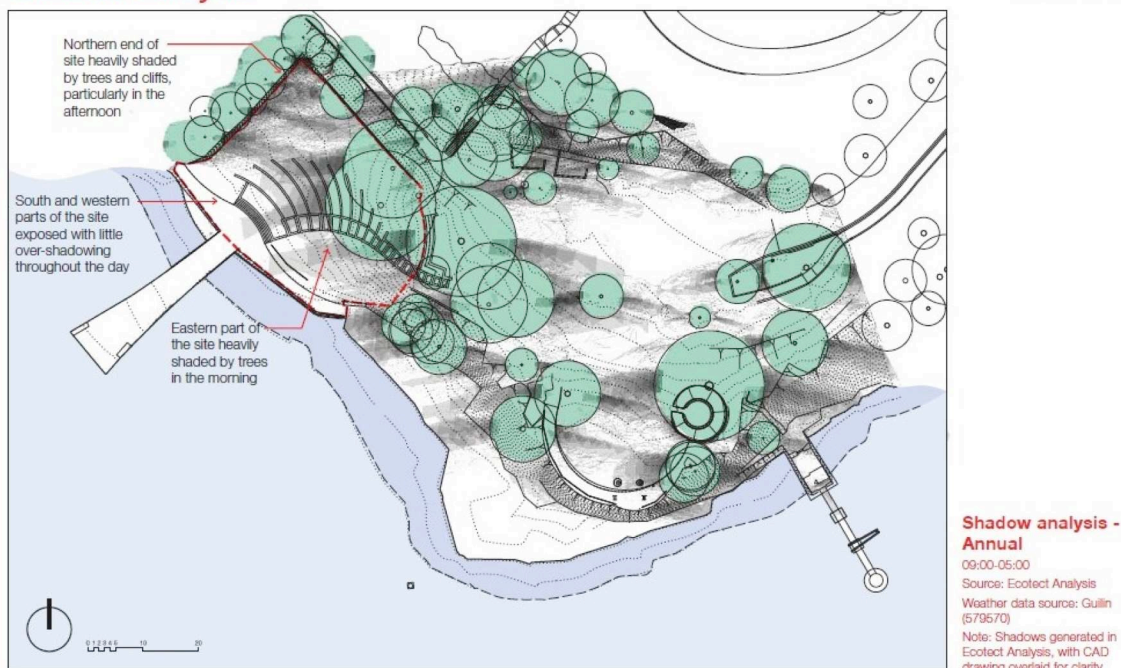


Figure 3: Student work: Shading study (Student M. Cochrane)

level 7 as their basis, in terms of striving to teach students to “reformulate and use relevant understanding, methodologies and approaches to address problematic situations that involve many interacting factors.”<sup>10</sup> Additionally these strategies incorporate current pedagogical thinking which seeks to promote and teach for inclusion of diversity through cultural simulation and empathetic teaching to diversity.<sup>11</sup> This enriches student-centred curriculum which has the ability to positively influence and prepare both students and teachers alike as opposed to homogenising teaching tools.<sup>12</sup>

### The Self-Brief

The project brief in the EDP module requires a student to design a small building which uses the least amount of energy possible to keep its users comfortable, and involves the design and analysis of a passive design building strategy. In order to do this students must research the microclimate of the site as well as its economic and social context, all of which are unfamiliar to the student. It uses two particular aspects in teaching students in grasping this unfamiliar. Firstly, the brief is set up to mirror to a real design problem, and a real design process where different issues can compete with each other. This project module is seen as a

reflection of the early stages of that process – from site to sketch design and then outline design. As noted above, the students are from different contexts but also different professional backgrounds, and so they are encouraged to think of how they contribute to a design team. Secondly, this module teaches students to adapt their existing design process to respond to unknown environmental design issues by requiring their design site to be in an unfamiliar climate and culture. The questionnaire responses reveals that most respondents now work to some degree in unfamiliar contexts (figure 2) or will in the future.

The students must initially define their ‘self-brief’ by choosing both a particular activity (e.g. school) and a site in a country they are not familiar with. In this way students must be able to analyse the climate from the data they collect, not from any known previous experience of that climate. Students are expected to depict the site in detail in their presentations and be able to build a massing model of it using software.<sup>13</sup>

One of the most important aspects of this module is the site analysis and microclimate study. Students are required to undertake detailed site analysis and outdoor comfort

# Micro climate

## Wind analysis

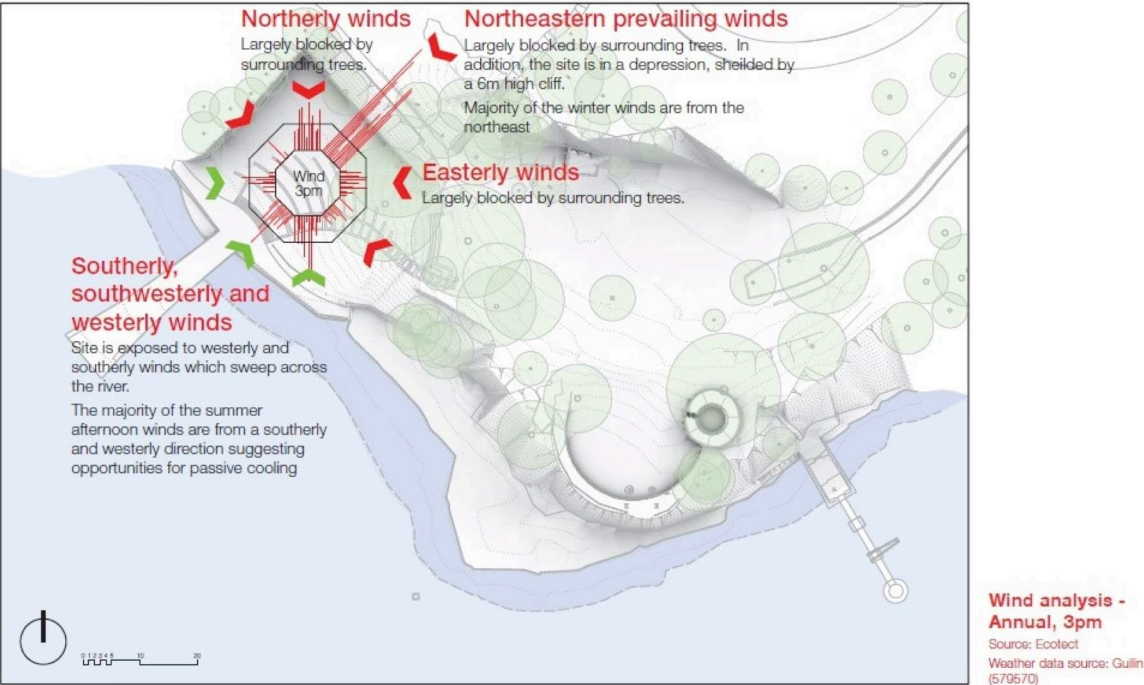


Figure 4: Student work: Wind Analysis (Student M. Cochrane)

assessment. They are expected to analyse the site in terms of wind, sun, noise, comfort, visuals and other environmental factors that are relevant. They need to be able to describe the site in great detail: where is the sunniest part? The shadiest part? The windiest part? To do this they need to analyse the site, the local topography and regional influences, using software or manual techniques (figures 3 & 4).

The self-brief is the tool for working on this. While students are assisted by tutors in signposting the details required within the self-brief, it is mainly student driven, and requires students to follow an evidence-based approach.

While it uses the details found in a typical client brief as a starting point it goes much deeper than this as each brief must detail the particular issues and objectives pertinent to the particular site location and particular activity chosen. This brief becomes a self-brief as students must prioritise elements based on their own evidence based argument. Initially students grapple with the detail required by the self-brief and the degree to which the information must be self-researched and gathered. The initial frustration is borne out by fact they cannot pre-empt the solutions or rely on their prior knowledge and instinct but instead must study the unfamiliar context from

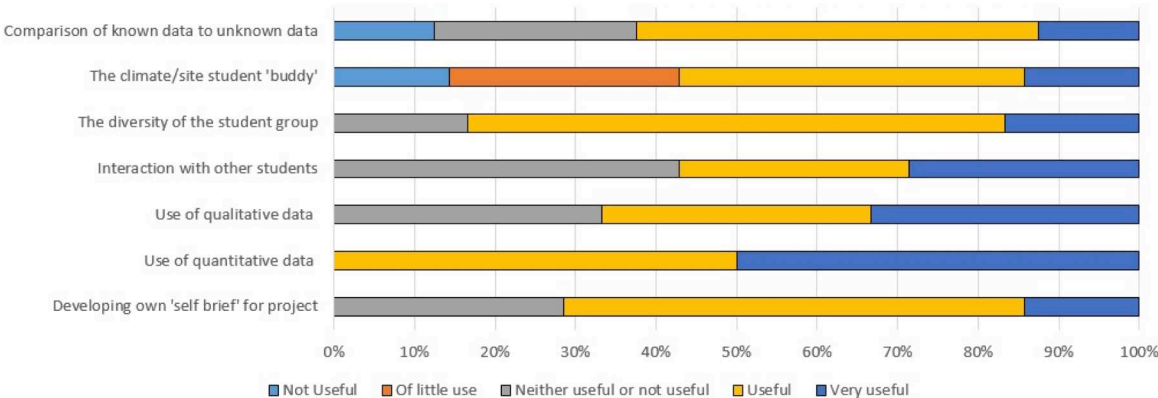


Figure 5: Usefulness of strategies (Author)





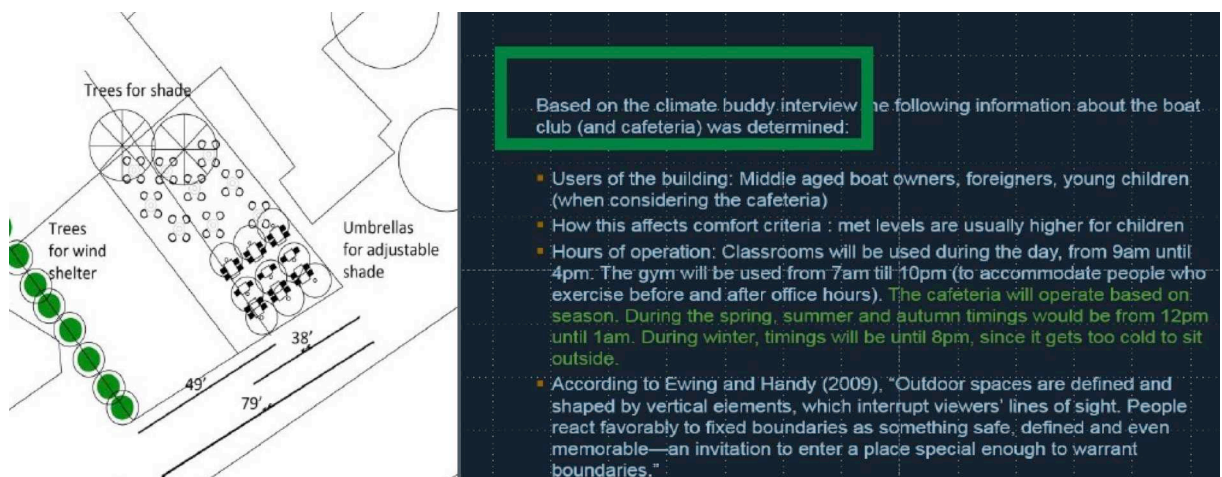


Figure 8: Student work: Use of buddy (Student H. Ahmed)

### Site ‘buddy’ and interview

The unfamiliar site which each student chooses is known to a fellow student either by being the country of their birth or being resident there for at least 1 year. Each student is therefore assigned a site ‘buddy’ who is seen as an insider to the site’s climate, culture and social norms. The buddy is seen as a representative of the unknown context and similar to any building user or community member. The buddy is not expected to be the primary source of information, instead students are expected to use the buddy to verify, discuss or dispute findings researched and as one ‘source’ of qualitative data for the site, in terms of its climate, topography and culture (figure 8).

Initially, students work with their buddies to refine a specific site choice, and use their buddies’ local knowledge to do this. They are then required to interview their buddy and to use the resulting interview as a qualitative source of evidence and analysis on their site and climate. From this starting point, as the project progresses, the buddy is used as a sounding board for climatic summaries, customs and norms (e.g. how building users dress, use space, behave, typical opening hours). This pedagogical device has many advantages. It stimulates several things in students: 1. Analysis skills in terms of the incorporation of more ‘soft’ qualitative information to their studies which can otherwise often go undocumented, particularly when dealing with microclimatic weather files; 2. Experience comparing qualitative and quantitative findings (more on this below); and 3. Interview skills which can be developed in

the future to building users or community. Additionally imposing such relationships between students enables them to form small communities of practice, the benefits of which are further outlined below. However, the success or otherwise of the buddy is very dependent on the success of the relationship struck between the students. Teaching observations reveal that where students do not take advantage of their buddy as a source of information they miss out on valuable insight that would aid their designs.

Respondents in the questionnaire were equally split in terms of the usefulness or not of the buddy and it was one of lower ranked devices (figures 5 & 6). This most likely reflects the extent to which students engaged in and utilised this aspect which varied from student to student and year to year. Module staff have in last two years been more stringent in requiring the interview to form part of the assessment which has resulted in students utilising the buddy more. The ease at which this device could be incorporated into other courses relies heavily on the diversity of the student body.

### Distance learning

As noted above the course is available as a distance learning course. It should be stated that distance learners complete the course entirely at a distance, enabling students to take the course without having to leave their homes, countries or jobs. The opportunity to pursue further education through this flexible learning approach enables a much broader and diverse student body than might otherwise pursue the course. This has an immediate and palpable



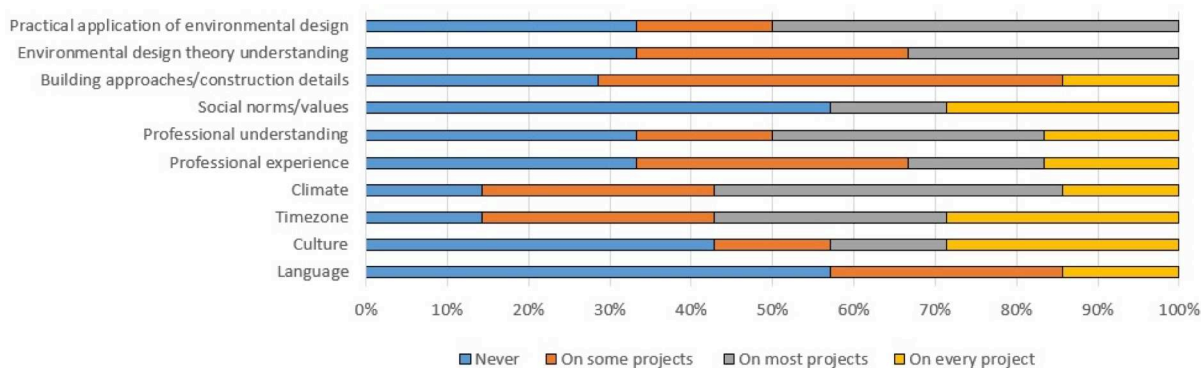


Figure 9: Differences experienced in unfamiliar contexts (Author)

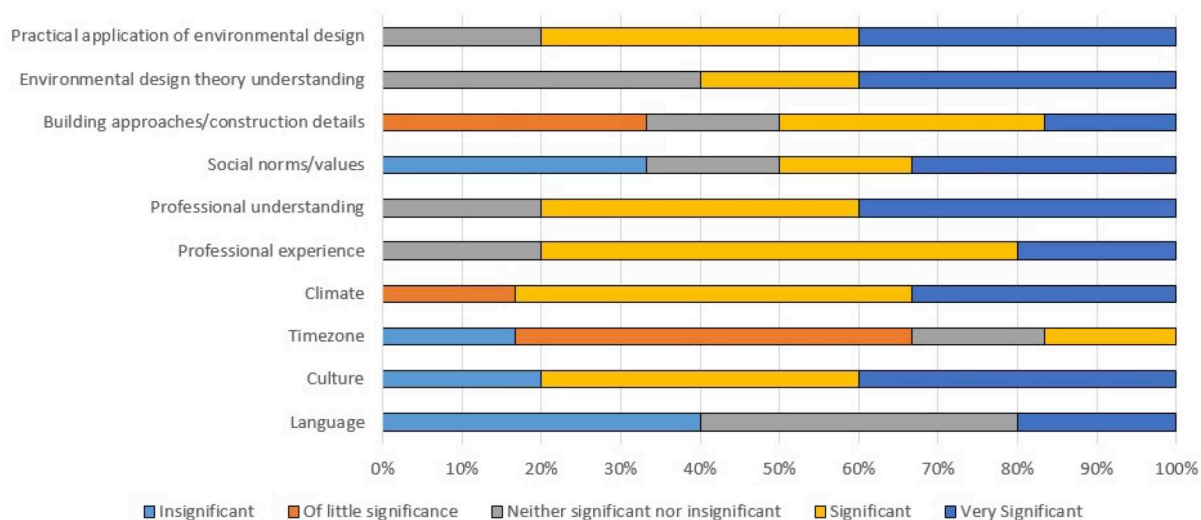


Figure 10: Significance of differences experienced in unfamiliar contexts (Author)

knock on effect for all students in grasping unfamiliarity as they are exposed to a much broader range of cultures and contexts, enabling communication between geographically isolated and disparate groups. Distance learners take modules concurrent with local students and therefore pursue their assessment together. They are required to do groupwork as a mixed virtual group. Using technology, learning can be done with students physically distributed across an environment, yet linked by data and collaborative discussion in what can be referred to as “classrooms with electronic walls.”<sup>15</sup> Pedagogically utilising distance learning means collaborative learning is therefore enhanced which in turn enhances critical thinking<sup>16</sup> as students must independently connect with each other, working collaboratively to discuss their ideas and take responsibility for their own learning. In this way students learn to cultivate virtual communities of practice (a group with shared concerns or passions, who frequently interact and thus deepen their knowledge and expertise in the shared topic)<sup>17</sup> such that this virtual

community can act as a mirror of the more customary communities of local knowledge or expertise architects might have traditionally drawn on. These virtual communities of practice are formed both formally through module requirements in the virtual classroom and virtual learning environment discussion board and informally with student-led social media groups and email groups. Students can adapt these communication skills to any unknown context in their professional lives, from geographically distant colleagues to forums on particular topics. It is argued that global architects who work in disparate communities of practice require the ability to learn through conversation and that such ‘buzz’ can take place in virtual interactions<sup>18</sup> and indeed that such wider global “constellations of practice” are not easily formed.<sup>19</sup> Indeed the questionnaire revealed respondents - who are now working in the field - come across differences in language, culture, timezone, climate, professional experience, professional understanding, social norms and values, building approaches and construction

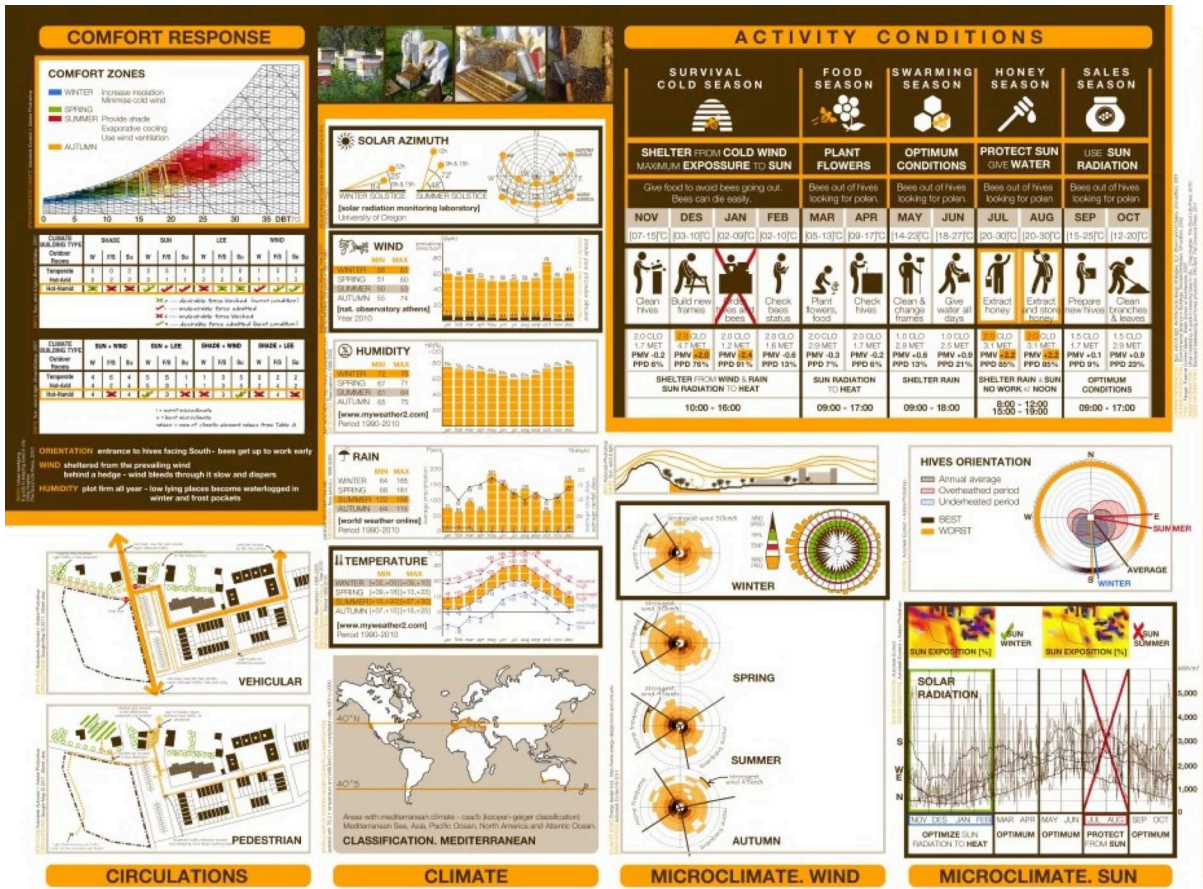


Figure 11: Student work: qualitative and quantitative elements analysed (Student E. Coma Bass)

details, environmental design theory understanding and practical application of environmental design on many projects (figure 9).

There was not much between most of these in terms of significance, but professional understanding and experience, climate and culture were seen to be marginally more noteworthy in terms of being barriers to their design process (figure 10).

This makes this a vital pedagogical device in that it provides students with the experience in confronting these differences and practice in how to overcome them. Indeed the questionnaire responses suggest respondents valued this interaction with other students as a device in grasping the unfamiliar (Figure 5, Figure 6).

In terms of pedagogical and other professional working skills, distance learning requires students to work as a virtual team. They must negotiate the challenges of differing timezones, modes of communication and find other approaches to solving a problem. They also improve their ICT skills and learn to work

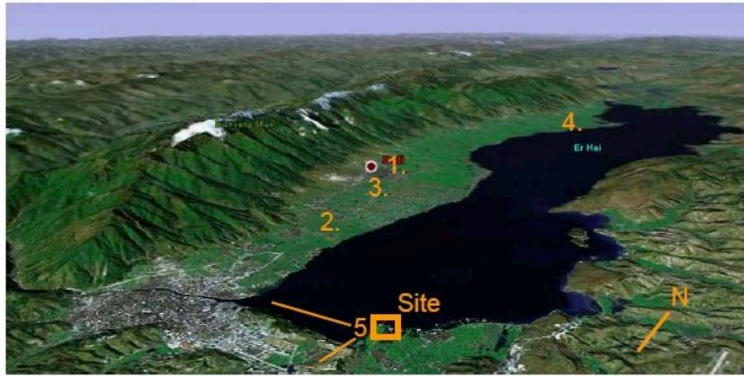
in a different community of practice. The EDP module uses web tools and teaching devices such as a virtual classroom environment and discussion boards to facilitate this virtual communication. These are skills and ways of working that are transferrable to the working environment and give a good grounding to grasping the unfamiliar. Not only that, but research suggests that some of the specific aspects of online interaction (such as asynchronicity and virtual memory) provide unique opportunities for collaboration and which foster learning processes unattainable in face-to-face contexts.<sup>20</sup> Distance learning has been a valued feature of the course since its inception. However, running course at a distance has distinct practical challenges that require dedicated staff, flexible staff working hours to overcome time zones, as well as significant technological resources.

### Qualitative and quantitative analysis

Students must have a two-pronged approach to their analysis in order to maximise grasping the unfamiliar. They must gather and analyse 'hard' quantitative data - e.g. climatic information such as temperature, wind,

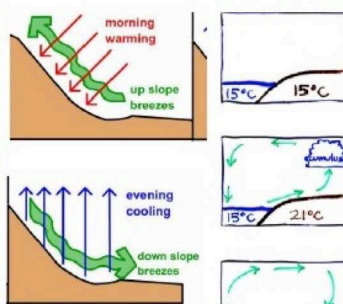


## Quantitative



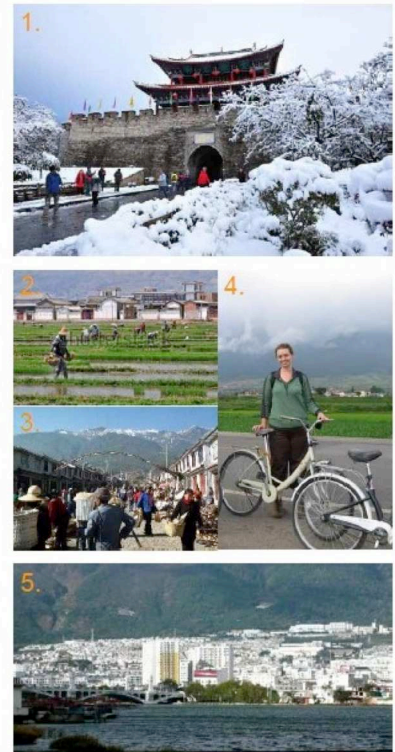
Regional analysis

## Region



Topographical and water mass influences: Site + Environment Notes 2012, Welsh School of Architecture

## Qualitative



Photos Sources: www.Flickr.com

Figure 12: Student work: qualitative and quantitative climate descriptions (Student R.Martin)

Relative Humidity, rainfall, sun and wind, shade and lee. Alongside that they must analyse the ‘softer’ information - e.g. the cultural issues at play, verbal descriptions of climate, findings from the buddy interview. This is required so not only can students improve the appropriateness of their research conclusions - and subsequent design solutions - by the collection and comparisons of different kinds of data around the same topic<sup>21</sup> but they can begin to develop solutions in the face of conflicting data.

In student work (figures 11 & 12) for example:

- choice of typical dress backed up by reference to both web sources and the site buddy;
- weather data and graphs accompanied by descriptions of the climate and conflicts between the two discussed and overcome;
- the final design solution evaluated not only in terms of the environmental impact but also social sustainability.

This device is straightforward and can be easily implemented into any course. Interestingly, though this device is a simple one, questionnaire respondents viewed it as the

most useful device. (Figure 5, Figure 6). This may be because the essence of this device is that students are taught to engage in grasping the unfamiliar from as many angles as possible and in doing so to try and make sense of it and turn an unknown into a known. This not only requires students to engage in triangulation of the data, but to realise that the more viewpoints are taken into consideration the more rounded a solution becomes. This prepares students to become critical thinkers and gives them the skills to apply such techniques to any problem, in any context. The use of both qualitative and quantitative information has been formalised over time and is now a requirement of assessment to enable students to have a fuller argument and a more rounded approach.

## Known versus unknown

Students during this module work not only with unfamiliar contexts but also concepts. This double unfamiliarity can confound an inability to move beyond the unknown. To overcome this barrier students are encouraged to relate the unknown to the known to enable them to fine tune their reactions. For example the may compare predicted energy use of their



Device	Ranked usefulness by questionnaire respondents	Observed usefulness in grasping the unfamiliar	Easy of adaption to other courses
	Scale		
	1(most useful) to 5 (least useful)	High to low	Easy to Difficult
Self-brief	2	High	Moderate
Site buddy	3	Moderate	Depends on diversity of group. May be difficult
Distance learning	2	High	Difficult
Quantitative V	1	High	Easy
Qualitative			
Known V	3	Moderate	Easy
Unknown			

Table 1: Summary of pedagogical devices (Author)

design to actual energy used in their own homes, or the air temperature of their site to that of their home city. From a more cultural perspective they may compare site context dress code or opening hours to those of their home countries.

This pedagogical device enables students to compare and therefore relate unknown entities to known ones and in this way they learn to understand such concepts. This is keeping with the thinking that researchers should compare experiential patterns with either predicted or established ones from earlier studies and those in different contexts.<sup>22</sup> The questionnaire revealed quite an ambiguous reaction to this device, with a range of responses (figures 5& 6). This is not wholly unexpected as this method is suggested to students but not a requirement. As such many students may not use this method. This tool developed from

students and we have encouraged subsequent students to use it. Going forward this may become an assessed requirement as we noted students who could compare unknown data and quantities to a known set of parameters could more quickly grasp the unfamiliar and convert unknowns to knowns.

Conclusion

The aim of this paper was to offer pedagogical solutions to architectural educators which help to enable students to learn an environmental design process for unfamiliar contexts and work within culturally diverse design teams. This paper offers a reflection on contemporary teaching and learning within this context through a case study approach of Environmental Design Practice, a one project MSc module (EDP) taught in the Welsh School of Architecture in Cardiff University.

Device	Origin and reasoning	Skills acquired	Fragilities
<b>Self-brief</b>	Developed from more prescriptive. To utilise growing student diversity. Responds to PG skill requirement.	Self-research; Objective data analysis.	Complexity of issues. Students require guidance.
<b>Site buddy</b>	More formalised relationship. To utilise growing student diversity. Interview now assessed component.	Objective data analysis; Data Triangulation; Interview skills.	Lack of diversity of students
<b>Distance learning</b>	Always been a valued component. To encourage diversity. More integration with each other/ local now.	Critical thinking; ICT skills; Forming community of practice; Team-working.	Student numbers Requires technology and staff buy-in.
<b>Quantitative V Qualitative</b>	Always been encouraged. To round out argument. Now an assessed component	Data Triangulation; Critical thinking.	/
<b>Known V Unknown</b>	From observed student use. To give richer understanding.	Concept understanding.	/

*Table 2: Evaluation of pedagogical devices (Author)*

The ‘self-brief,’ site ‘buddy’ and interview, distance learning mode, use of both qualitative and quantitative information to round out an argument and comparing known actualities to unknown are all pedagogical devices used in EDP module. Unfamiliar contexts and cultures are integrated into the fabric of the module as students are encouraged to challenge themselves through their exploration – both formally and informally. They have been described and evaluated through this case study paper. Table 1 lists these pedagogical devices in terms of their ranked and observed usefulness and the ease by which other courses may use the device. Table 2 outlines their origin and development, the skills acquired by students in utilisation of each device and fragilities with the devices. The main fragilities

of these strategies lie mainly on the reliance of the diversity of the student body to generate diverse site contexts. It should be noted that these devices have transformed over time in response to student feedback, changing pedagogical best practice and module evolution and will likely further evolve. Anticipated improvements under consideration include the collation of past student work as a resource for students and the use of light apps to compare real-time data to the ‘feeling’ of local weather experienced. It is interesting to note that the questionnaire respondents all felt they had not only the skills and confidence to work in unfamiliar contexts but that the MSc and the EDP module in particular helped students to acquire these skills (figure 13).

All of these devices work together to enable students to develop and adapt a design process that can adjust and regulate itself to each subsequent unknown context. This enables students to build a repository of transferrable skills that can be amended and employed as appropriate. These skills are self-research, objective data analysis, interview skills, ICT skills, Community of Practice forming, critical thinking, concept understanding, analysis and triangulation of data, team working. The reasoning behind requiring students to work in unknown contexts is an attempt to remove subjectivity and enable students in grasping the unfamiliar based on both qualitative and quantitative data as we have seen. It doesn't allow architects to rely on subjective judgement or intrinsic understanding and experience; instead it facilitates architects need to build a repertoire of skills which they can draw on where their instinct is uninformed; the gut response may be correct but it needs to be critiqued and subsequently adapted. The devices described work well to achieve these aims and are largely seen as useful by students.

Whilst this case study module is focused on devices working together in the education of architects in environmental design, a summary is offered of the usefulness of each device and its ease of adaption in order for architectural educators to evaluate the device in relation to their own teaching context and according to their own resources, budget, flexibility or student skills required. Architectural education needs to adapt to teach students transferrable skills that enable them to work in unfamiliar contexts with diverse design teams.

It should be noted that whereas there may be a general reaction in the European university setting to the inflow of non-western students, which then oversimplifies the phenomenon and shapes curricula to educate architects specifically for non-western contexts and their needs, this module programme is not intended to be rigidly moulded to any particular non-traditional non-western context. Instead it is aimed to prepare students to work in any unfamiliar context by teaching transferrable skills. In this way they are taught that there is no one right answer, that they must learn to negotiate unknowns, half-truths and incomplete information through this adaptable design process in grasping the unfamiliar.

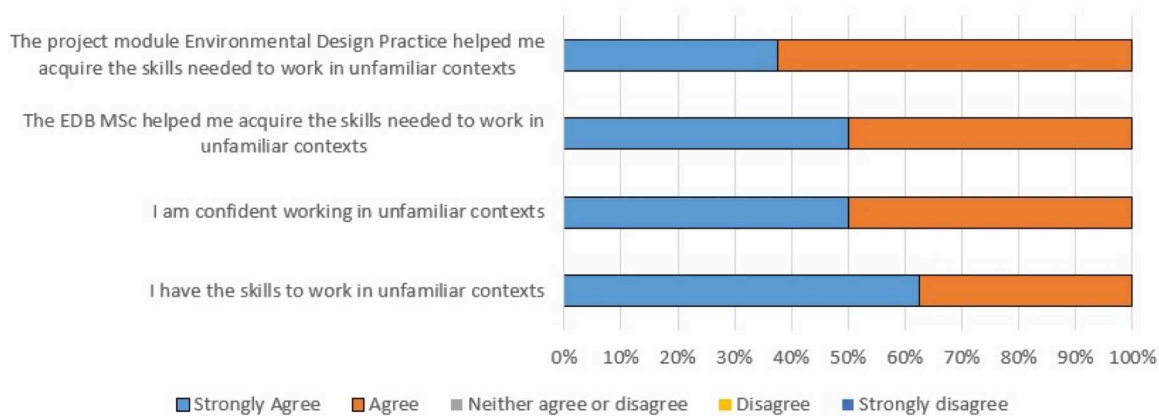


Figure 13: Alumni skills (Author)



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